The control of *Paspalum dilatatum* in *Cynodon dactylon* sports turf

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Summary A trial was conducted in Sydney's south-west using various treatments to ascertain their effectiveness in controlling *Paspalum dilatatum*.

The treatments consisted of five herbicides, a growth regulator, and an untreated control. These products were applied individually, in combination and with multiple applications. The application treatment was 1, 2 or 3 applications 14 days apart.

Of the 45 chemical treatments, only seven achieved a reduction of 80% or greater. The only treatments to achieve a reduction of 90% or greater were DSMA (7.89 kg a.i. ha^{-1}) + 2,4-D (1.1 kg a.i. ha^{-1}) and DSMA (7.89 kg a.i. ha^{-1}) + 2,4-D (0.55 kg a.i. ha^{-1}) with three applications.

Keywords *Paspalum dilatatum*, *Cynodon dactylon*, DSMA, MSMA, Trifloxysulfuron, Quinclorac, Trinexapac ethyl, 2,4-D.

INTRODUCTION

Paspalum dilatatum is serious perennial weed of turfgrass causing aesthetic and surface disruption problems to medium and high quality turf areas. Presently the only viable control is via chemical means and this is only achieved after repeated applications. This is particularly the case as the plant matures.

The only chemicals to deliver consistent results selectively are the arsonates DSMA and MSMA. However these products have some undesirable characteristics in that they have a dangerous toxicology to mammals and can cause phytotoxicity to the desired turf species with repeated use.

These research trials where conducted for the thesis component for the degree in Masters of Agriculture (Turf Management) at Sydney University. The research was focused on evaluating the potential of new generation herbicides for the control of *P. dilatatum* in *Cynodon dactylon*. It also evaluated the potential of combining a growth regulator with both the new and existing herbicides.

It has also been reported that the phenoxy herbicide 2,4-D when combined with DSMA produces a synergistic result with increase efficacy on *P. dilatatum* (Bockholt 1957). This treatment was included as another comparison.

Further treatments included multiple applications at 14-day intervals. Treatments where applied singly, twice and three times to ascertain the number of applications required to deliver effective control.

MATERIALS AND METHODS

The trial was replicated using a completely randomised design. Plot size was 1 m × 1 m.

Treatments The treatments consisted of five herbicides (Table 1), a growth regulator, and an untreated control. These products were applied individually, in combination and with multiple applications. The application treatment was 1, 2 or 3 applications 14 days apart. The first application was applied on the 29th of March 2001.

Evaluation *P. dilatatum* density was measured as percentage herbage covered per plot using the quadrat method. The quadrat was a 1 m × 1 m frame with crosshatched strings at 10 cm intervals that divide the frame into 100 even squares. Readings where based on the *Paspalum* presence in each of these squares. Presence of a *Paspalum* in an individual square is recorded as percentage covered.

P. dilatatum density was measured fortnightly. Statistical analysis was done on percentage control for each plot in comparison to the original weed infestation for each particular plot. This procedure was used due to the variability of *P. dilatatum* across the site.

Site Located in Sydney's south-west, the soil is typical of those derived from Wianamatta Shale, being typically a heavy loam to clay-loam. Soil tests reveal a near neutral pH and no concerns with soil salinity.

Equipment Applications were made with a LPG pressurised small plot boom sprayer. Nozzles were Tee Jet 8002 series spaced at 50 cm. Height of the boom was 50 cm from the ground with two nozzles used to deliver a width of 1 metre. Water volume was 400 L ha^{-1}.

Table 1. Chemicals in trial.

Product type	Active ingredient
Herbicide	Trifloxysulfuron
Herbicide	DSMA
Herbicide	MSMA
Herbicide	Quinclorac
Herbicide	2,4-D
Growth regulator	Trinexapac ethyl

RESULTS

The data was analysed as the percent reduction achieved when compared to the pre-treatment counts for each individual plot. This analysis was favoured due to the variability in the infestation across the trial area.

Due the high treatment number (46) the results reported here are only those treatments with above 80% reduction. The results reported here are 19 weeks after first treatment (Table 2).

DISCUSSION

Of the two new chemicals Trifloxysulfuron was the only one to exhibit efficacy in controlling *Paspalum dilatatum*. Trifloxysulfuron achieved at least partial control with even a singular application, however it took three applications of 101.25 g a.i. ha^{-1} before 70% reduction was achieved. The addition of MSMA improved the efficacy of Trifloxysulfuron when compared to either active ingredient applied on its own.

Quinclorac did not exhibit efficacy even with repeat applications.

The addition of the plant growth regulator Trinexapac ethyl did not enhance or antagonise the efficacy of the treatments it was combined with.

Treatments with singular applications were not effective in obtaining acceptable control. The only treatment to gain acceptable control with 2 applications was DSMA (7.89 kg a.i. ha^{-1}) + 2,4-D (1.1 kg a.i. ha^{-1}).

With products currently available, this research suggests that a combination of DSMA at 7.89 kg a.i. ha^{-1} and 2,4-D at 1.1 kg a.i. ha^{-1} with three applications 14 days apart will deliver the most efficacious control.

The future entry of Trifloxysulfuron into the market also allows a combination with reduced rates of MSMA as another option. Table 3 illustrates the potential of this compound to achieve efficacy with reduced amounts of active ingredient per hectare.

REFERENCES

Bockholt, E.B. (1957). Selective Control of Dallisgrass in Bermudagrass turf. *USGA Green Section* February, 23-25.

Table 2. Results – 19 weeks after first treatment.

Treatment	Applications	Percent reduction
DSMA (7.89 kg a.i. ha^{-1}) + 2,4-D (1.1 kg a.i. ha^{-1})	3	93.43 a
DSMA (7.89 kg a.i. ha^{-1}) + 2,4-D (0.55 kg a.i. ha^{-1})	3	93.15 ab
DSMA (7.89 kg a.i. ha^{-1})	3	87.16 bc
Trifloxysulfuron (30 g a.i. ha^{-1}) + MSMA (1.12 kg a.i. ha^{-1})	3	84.08 c
DSMA (7.89 kg a.i. ha^{-1}) + 2,4-D (1.1 kg a.i. ha^{-1})	2	82.97 c
Trifloxysulfuron (26.25 g a.i. ha^{-1}) + MSMA (1.12 kg a.i. ha^{-1})	3	82.82 c
DSMA (7.89 kg a.i. ha^{-1}) + Trinexapac ethyl (275 g a.i. ha^{-1})	3	82.04 c
	LSD ($P<0.05$)	6.18

Values followed by the same letter are not significantly different at the 5 percent level on the Duncan's Multiple Range Test.

Table 3. Total amount of active ingredient ha^{-1}.

Treatment	Applications	Total amount of a.i.
DSMA (7.89 kg a.i. ha^{-1}) + 2,4-D (1.1 kg a.i. ha^{-1})	3	26.97 kg
DSMA (7.89 kg a.i. ha^{-1}) + 2,4-D (0.55 kg a.i. ha^{-1})	3	25.32 kg
DSMA (7.89 kg a.i. ha^{-1})	3	23.67 kg
Trifloxysulfuron (30 g a.i. ha^{-1}) + MSMA (1.12 kg a.i. ha^{-1})	3	3.45 kg
DSMA (7.89 kg a.i. ha^{-1}) + 2,4-D (1.1 kg a.i. ha^{-1})	2	17.98 kg
Trifloxysulfuron (26.25 g a.i. ha^{-1}) + MSMA (1.12 kg a.i. ha^{-1})	3	3.44 kg
DSMA (7.89 kg a.i. ha^{-1}) + Trinexapac ethyl (275 g a.i. ha^{-1})	3	24.5 kg